

PROSPECTIVE STUDY OF PTSD IN POLICE OFFICERS

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Risk/Vulnerability Factors

Brewin et al, 2000, JCCP, 68,748-66

McFarlane, 2000, J Clin Psychiatry, 61, Suppl 5, 15-20

- Demographics: Female; Hispanic Ethnicity
- Childhood abuse or neglect, other prior trauma
- Personal or family history of anxiety or mood disorders
- Poor social support at time and after
- Lower education, socioeconomic status, lower I.Q.
- Greater stressful life events in prior year and after
- Greater acute stress symptoms; persistent hyperarousal
- Dissociation at time of event: slow motion, unreality like dream, movie, play, confusion
- Panic at time of event, heart racing, terror, horror



Prospective Study of Academy Recruits: Assessment Timeline

N = 480



Predictors

BASELINE

**Psychological
Characteristics**

**Acoustic Startle
Video Challenge
Salivary Cortisol**

**Family
History**

**Trauma
History**

**Lark vs. Owl
Rhythm**

**DSM-IV
Sleep Disorders**

POLICE SERVICE

**Critical Incident
Exposure**

**Peritraumatic
Responses**

**Routine Work
Stress**

**Sleep
Disturbances**

**Circadian
Dysrhythmia
Actigraphy**

Outcomes

**Traumatic
Stress
Symptoms**

**General
Functional
Disturbance**

**Performance and
Fatigue
Psychomotor
Vigilance**

Childhood Trauma and Biological Stress Response

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Childhood Trauma and Psychopathology

- Child abuse / neglect : 2.5 mil. cases per year in US
- Associated with increased risk for mood and anxiety disorders
- Mechanisms of this association unclear

* (American Academy of Pediatrics)

(Bremner 1993, Dube 2001, McCauley 1997, Stein 1996, Yehuda 2004, ...)



Childhood Trauma

- Risk factor for adult psychopathology (Kessler et al., 1997;).
- Associated with abnormalities in the psychobiology of threat:
 - Non-human animals (e.g., Coplan et al., 1998; Sanchez et al., 2005)
 - Human children (e.g., Cicchetti & Rogosch, 2001)
 - Human adults (e.g., Metzger et al., 1999)

Theoretical Model of Effects of Childhood Trauma on Adult Psychopathology



Early Trauma

- **Increased neuroendocrine and sympathetic nervous system response to stress in animals ***
- **Increased neuroendocrine and sympathetic nervous system response to stress in patients with mood and anxiety disorders #**

* (Coplan 1996, 1998, Meaney 1991, Plotsky 1993, Rosenblum 1994,...)

(Bremner 2003, Elzinga 2003, Heim 2000, Metzger 1999, Nemeroff 2004, Orr 1998)



Rationale

- **Unknown if the increased stress response is due to psychopathology or due to childhood trauma**

Research Question

- **Is childhood trauma associated with an increased stress response in healthy adults without current psychopathology?**



Participants and Procedures

- **Police academy recruits (n=76, age 28 ± 5 years, 11 women) from 8 Bay Area police departments**
- **20 min. stress-video in which real-life officers were exposed to highly stressful situations**
- **Salivary cortisol and MHPG (major metabolite of norepinephrine) at time 0, 20, and 40 min**
- **Childhood Trauma (< 14 yrs.) assessed with Life Stressor Checklist**

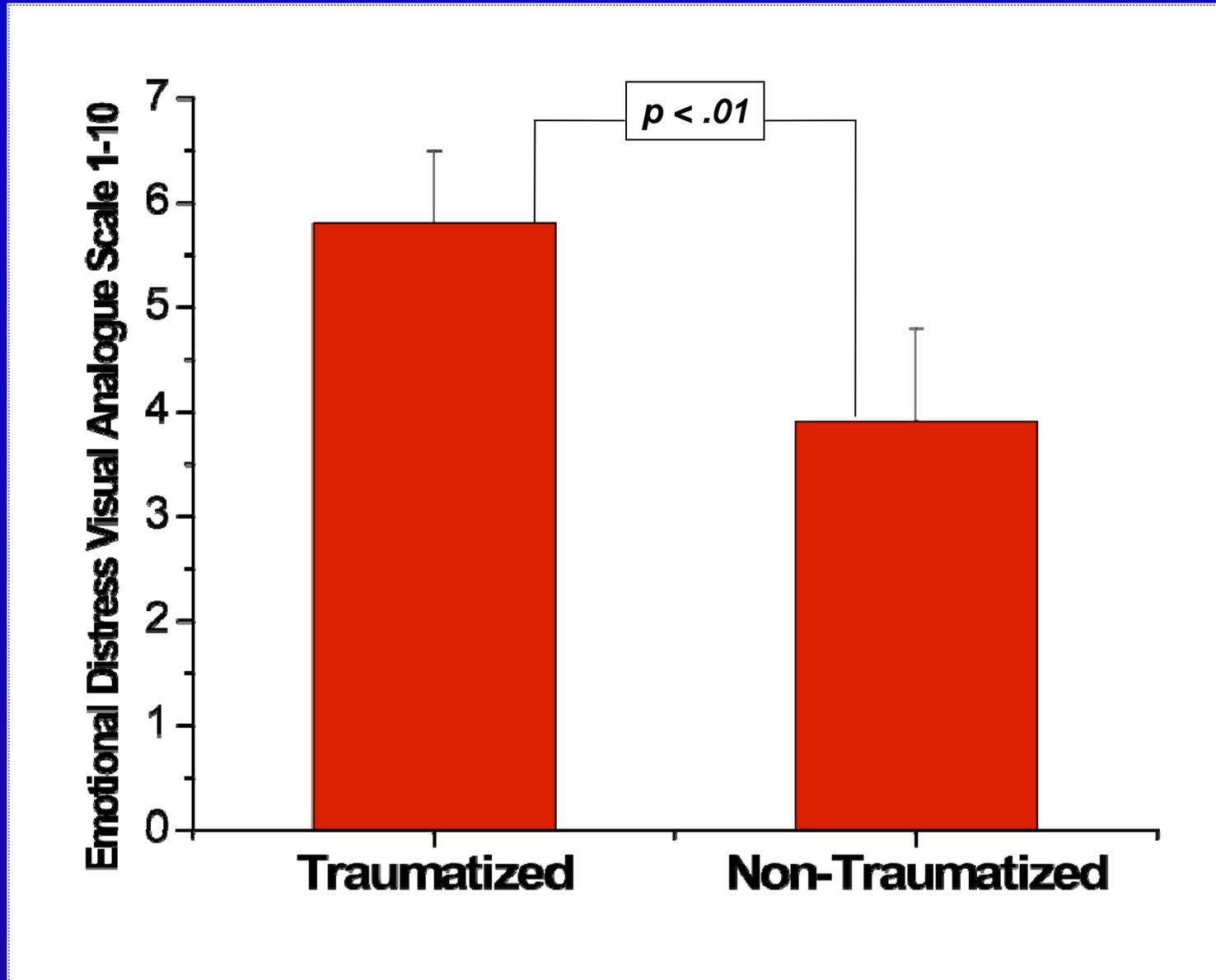


Participant Characteristics

	With trauma (n = 16)	Without trauma (n = 61)	p-value
Age, mean (SD)	27 (4)	28 (5)	.41
Women, no. (%)	1 (6)	9 (15)	.45
SCID current axis 1 diagnosis	0	0	-
SCID lifetime depression, no. (%)	4 (25)	1 (1.6)	<.01
SCL-90, Global Severity Score	0.1 (0.1)	0.1 (0.1)	.89
MAST (alcohol use)	2 (3)	2 (3)	.84
DES (trait dissociation)	8 (8)	5 (5)	.10
PDEQ (dissociation during video)	1.4 (0.4)	1.3 (0.4)	.16



Subjective Emotional Distress



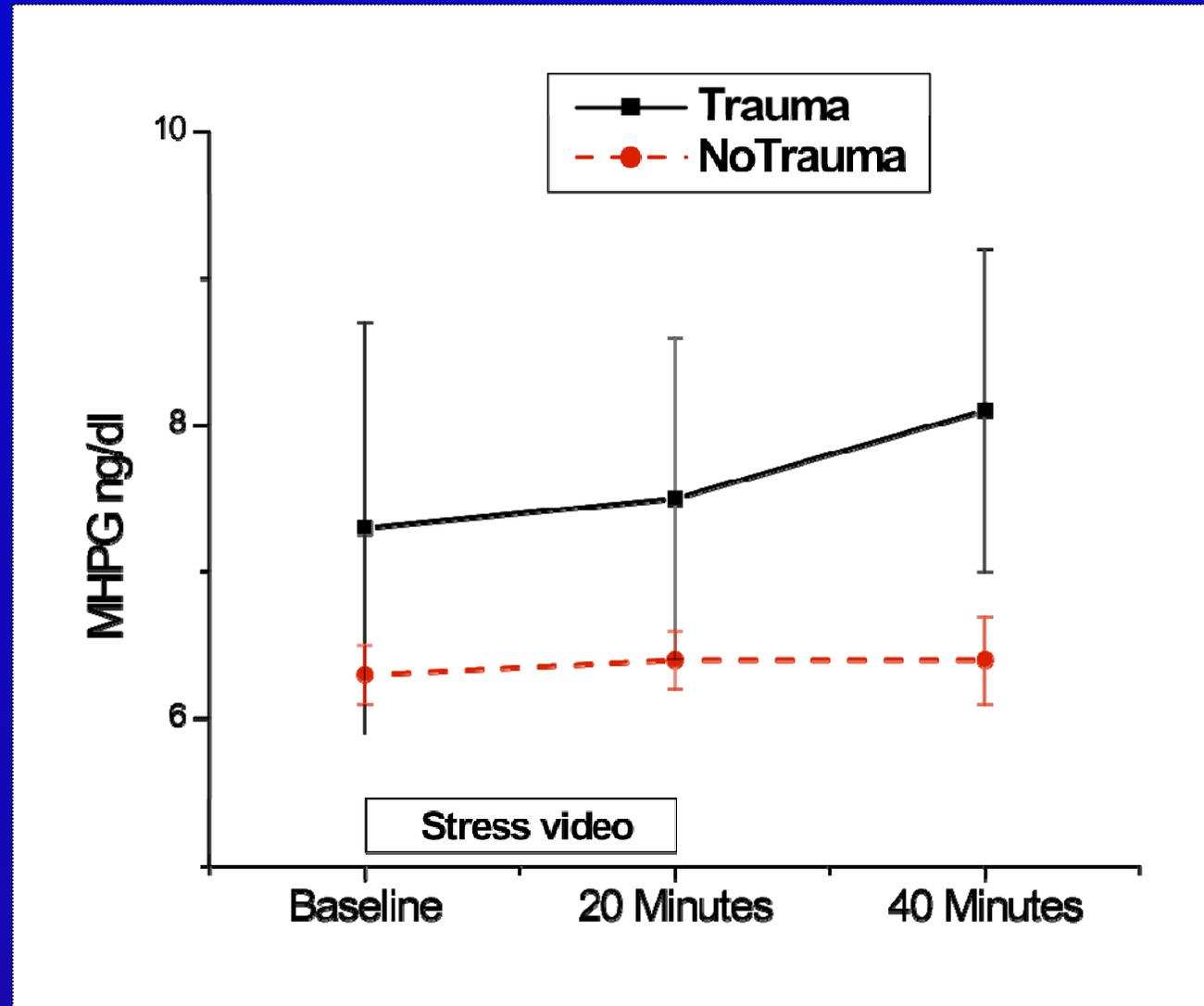
MHPG

Mixed Model Analysis:

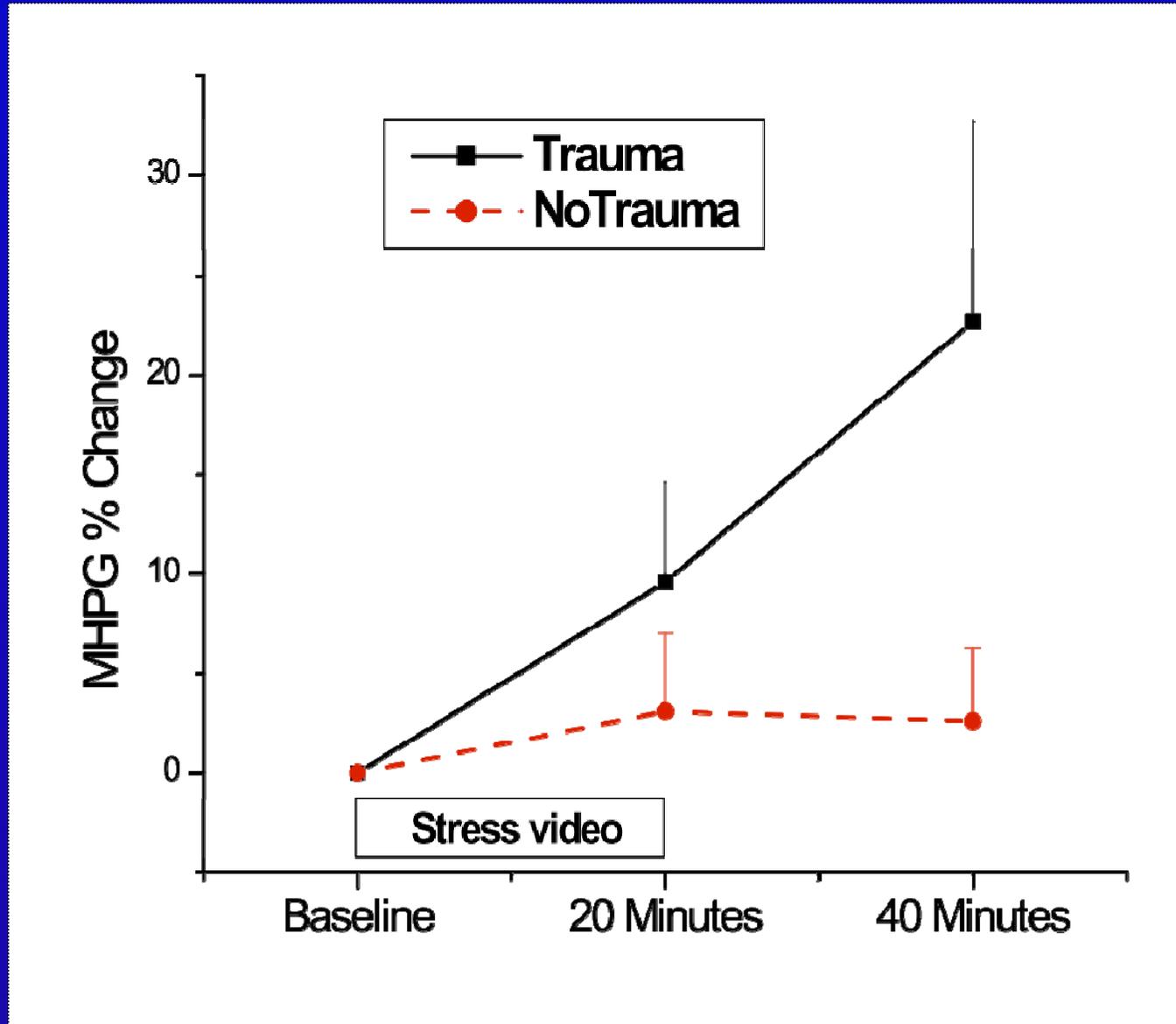
Time: $F=4.4$, $p=.04$

Group: $F=8.0$, $p < .01$

Group x Time:
 $F=4.1$, $p=.047$



MHPG Response



Cortisol

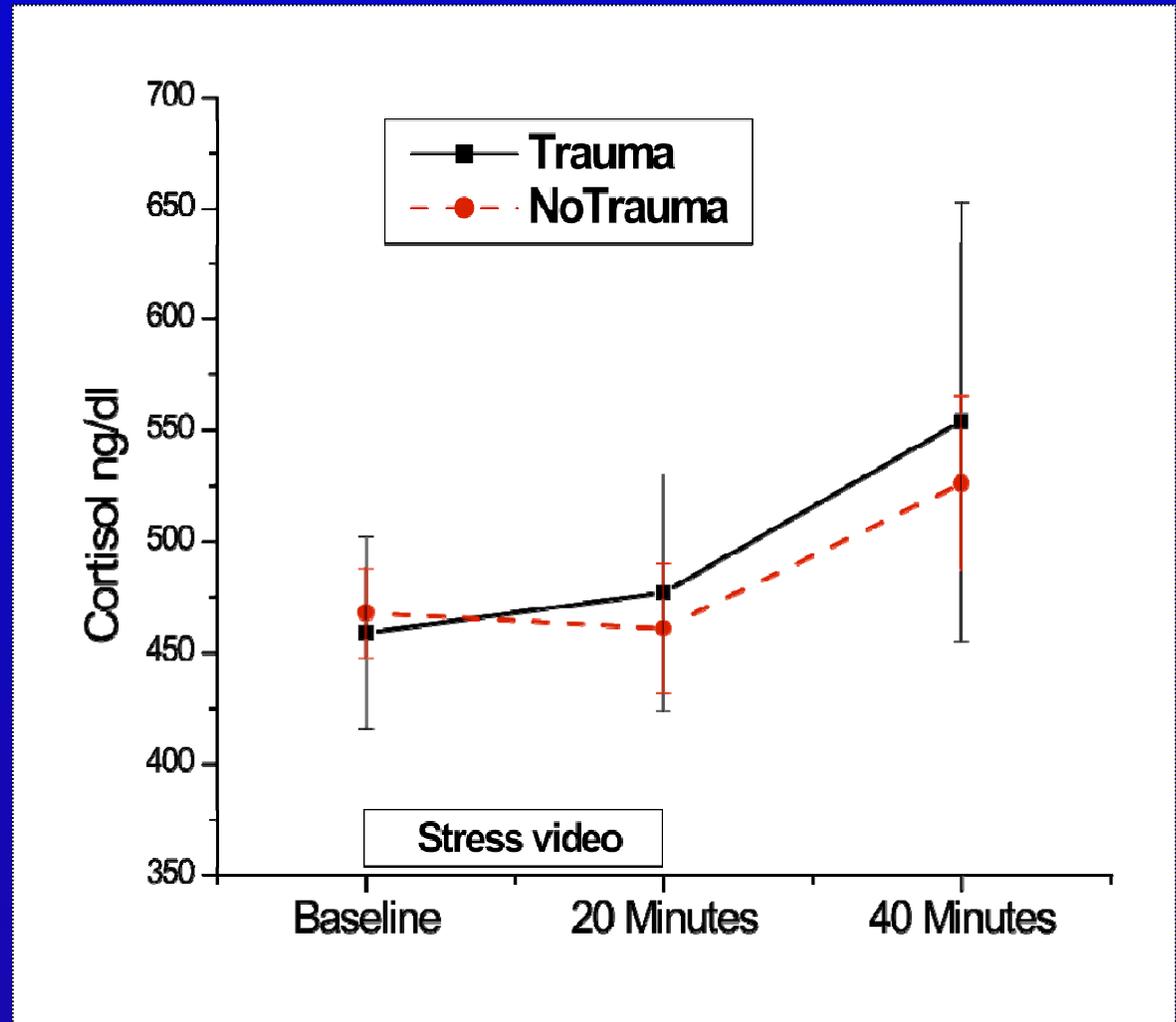
Mixed Model Analysis:

Time: $F = 11.2, p < .01$

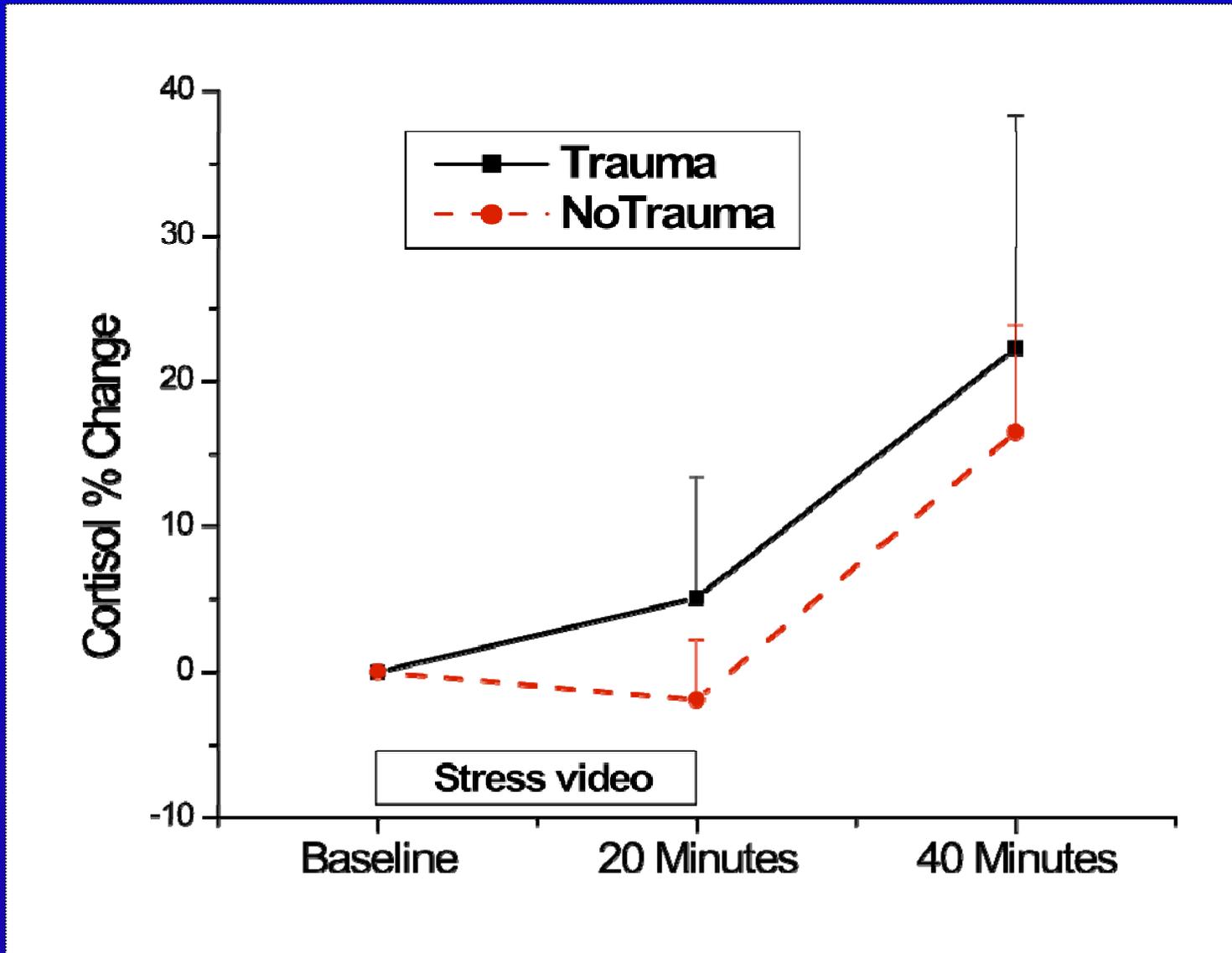
Group: $F = 0.4, p = .52$

Group x Time:

$F = 0.5, p = .47$



Cortisol Response



Limitations

- **Assessment of childhood trauma retrospectively and with self-report**
- **Only 13% women**
- **Small sample size**
- **Selected population**



Conclusions

- Childhood trauma associated with increased catecholamine response to stress
- Increased activity of the amygdala with increased locus ceruleus/sympathetic nervous system activity ? *
- Officers with childhood trauma and/or increased stress response might be at greater risk for PTSD

* (Davis 2002, Koob 1999, LeDoux 2003, Nemeroff 2004)



Effects of Childhood Trauma on Physiological Responses to Fear-Potentiated Startling Sounds

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Methods

- Participants
 - 101 police cadets recruited from SF Bay Area
 - 86.1% Male,
 - 42% Caucasian
 - Age (M = 28.6, SD = 5.9 years)
- Assessed With Clinical Interviews
 - Life Stressor Checklist
 - CT+ (n = 26), CT- (n = 75)
 - Mean age of trauma was 10 years old (SD = 2.5)
 - Events included disasters (61.5%), physical assault (31.8%), mugging (19.2%), illness (7.7%), accident (7.7%), sexual abuse (3.8%).
 - Most (84.6%) had only one trauma type
 - SCID-IV
 - No current psychopathology
 - Six met past major depression (MDD) (CT+ =4, CT- = 2), $p < .05$



Demographics and Psychometrics

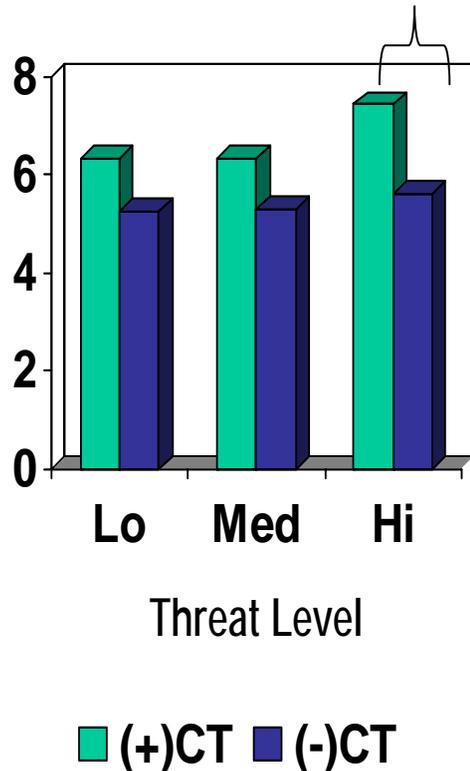
Variable	Childhood Trauma (CT+) (n = 26)	No Childhood Trauma (CT-) (n = 75)
Age (years)	28.2 (4.9)	28.7 (6.0)
Education (years)	15.0 (1.5)	15.3 (1.4)
Adult Exposure (#)	.73 (.67)	.91 (.96)
Social Desirability	3.0 (1.9)	3.4 (2.6)
Trait Anxiety	31.1 (5.7)	30.9 (5.7)
Positive Affect	3.9 (.68)	3.8 (.73)
Negative Affect	1.4 (.32)	1.3 (.32)
Psychiatric Distress	.17 (.21)	.14 (.15)

No significant group differences

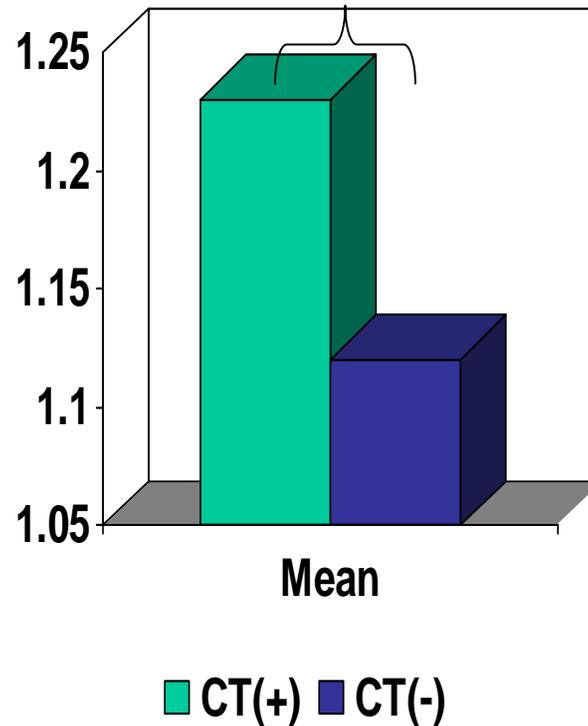


Physiological Responses to Fear-Potentiated Startling Sounds

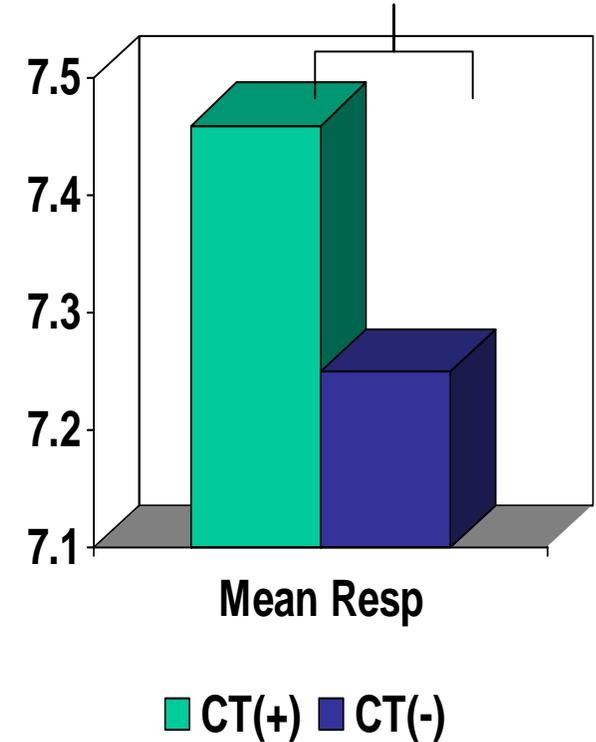
Eyeblink EMG



Skin Conductance¹



Heart Rate



* $p < .05$, *** $p < .001$

¹Results are adjusted for baseline skin conductance differences.



Follow-Up Analyses

- Analyses excluded:
- Female Cadets ($n = 14$)
 - Group X Threat Condition interaction on EMG became marginally significant ($p = .08$)
- Cadets on Psychoactive Meds ($n = 3$)
 - Results unchanged
- Cadets with Past Major Depression ($n = 6$)
 - Results unchanged



Baseline Behavioral and Biological Predictors of Critical Incident Related PTSD Symptoms

- 191 academy recruits were administered the WASI
- Higher IQ associated with lower peritraumatic dissociation at 6 months, $r = -.286$, $p = .01$
- Controlling for education, higher IQ associated with lower PTSD symptoms on Miss CV at 6, $r = -.294$, $p = .01$ and 12 months $r = -.454$, $p < .01$
- Childhood trauma associated with greater PTSD symptoms at 12 months, $r = -.289$, $p = .01$



Baseline Behavioral and Biological Predictors of Critical Incident Related PTSD Symptoms

- 50 recruits assessed for adrenergic reactivity (MHPG) responses to a stressful challenge video
- A trend level relationship between greater MHPG response to the stress challenge video (log area-under-the-curve) and combined 6- and 12-month PTSD symptom levels on MCV, $F(1, 49.53) = 3.32, p = .075$, linear mixed effects model



Baseline Behavioral and Biological Predictors of Critical Incident Related PTSD Symptoms

- Neuroticism assessed with 5 factor NEO during training associated with greater peritraumatic distress to most distressing event at 12 months ($n = 60, r = .296, p < .05$)
- Neuroticism associated with PTSD symptoms on MCV at 6 months ($n = 39, r = .366, p < .05$) and 12 months ($n = 59, r = .279, p < .05$)

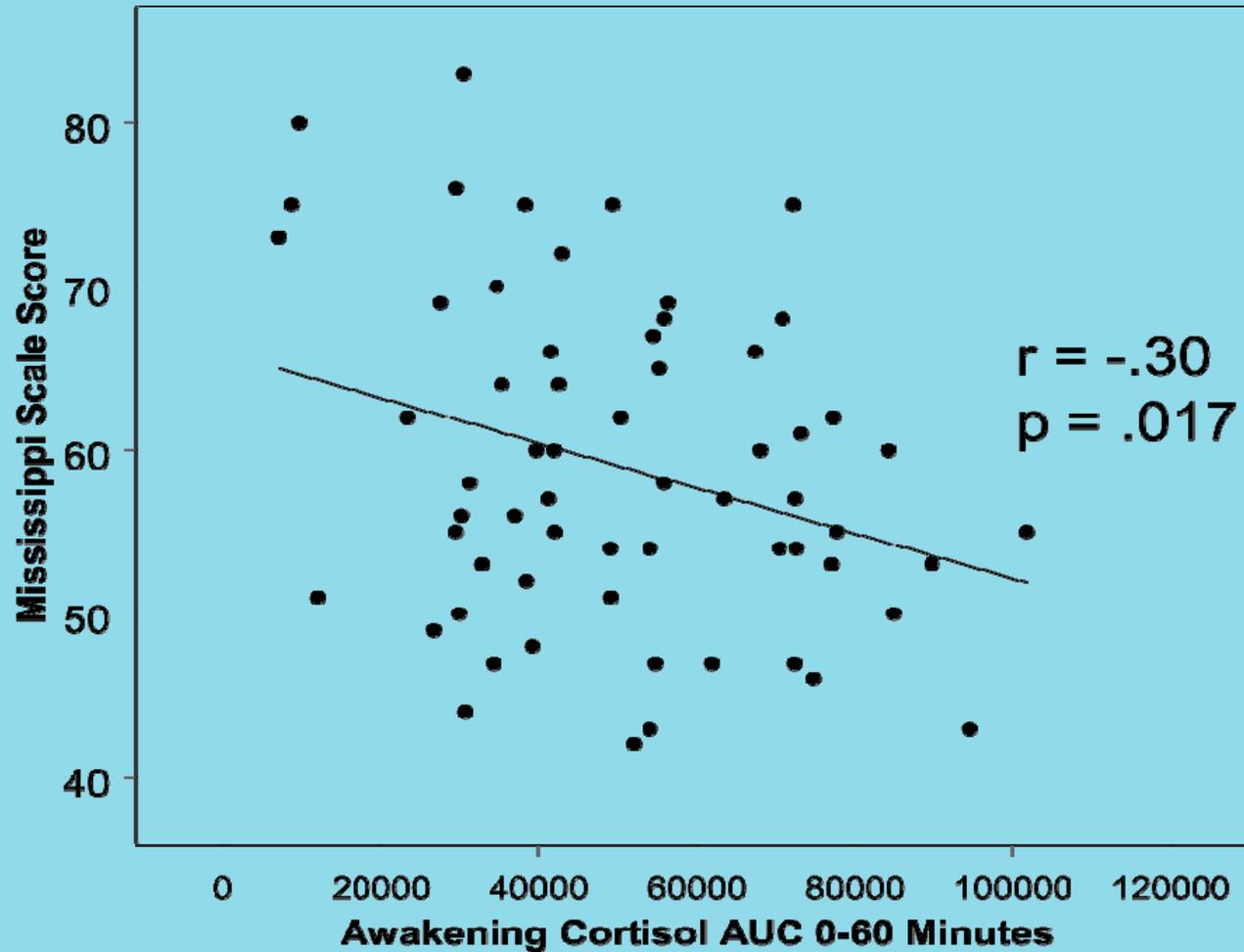


Demographics, N = 74

- 85% Male
- Mean Age = 27.5 years, S.D. = 5.3
- 68% College Graduates, 28% 2 Yrs. College, 4% High School Graduates
- 58% Caucasian, 21% Asian, 17% Hispanic, 3% African American



Awakening Cortisol Predicts MCS



Correlations between Startle Responses and PTSD Checklist (PCL) Scores

	Low Threat	Medium Threat	High Threat
SC Response	$r = .05$	$r = .36^*$	$r = .24$
HR Response	$r = -.04$	$r = .44^*$	$r = .04$
EMG Response	$r = .07$	$r = -.04$	$r = .01$

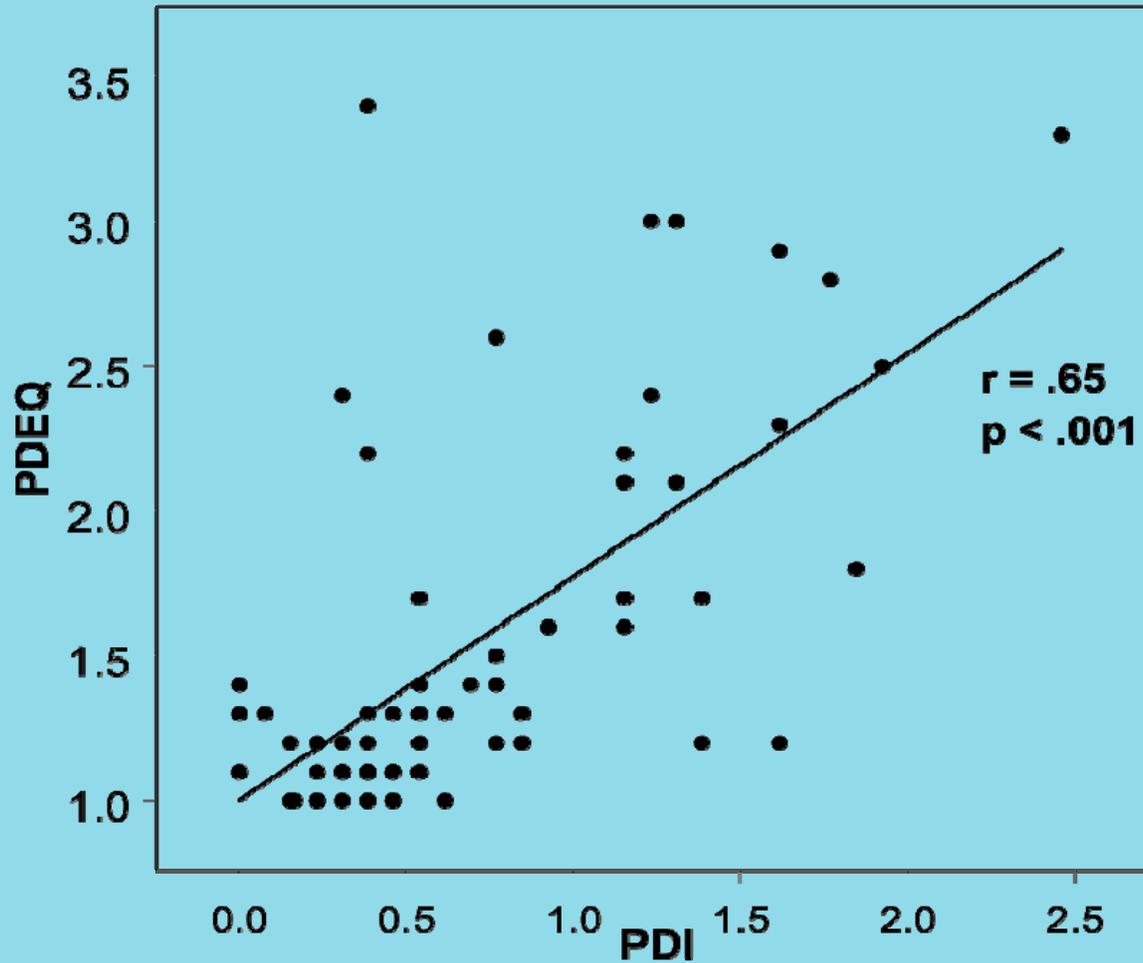


Correlations of Peritraumatic Responses with PTSD Symptom Levels to Worst Critical Incident

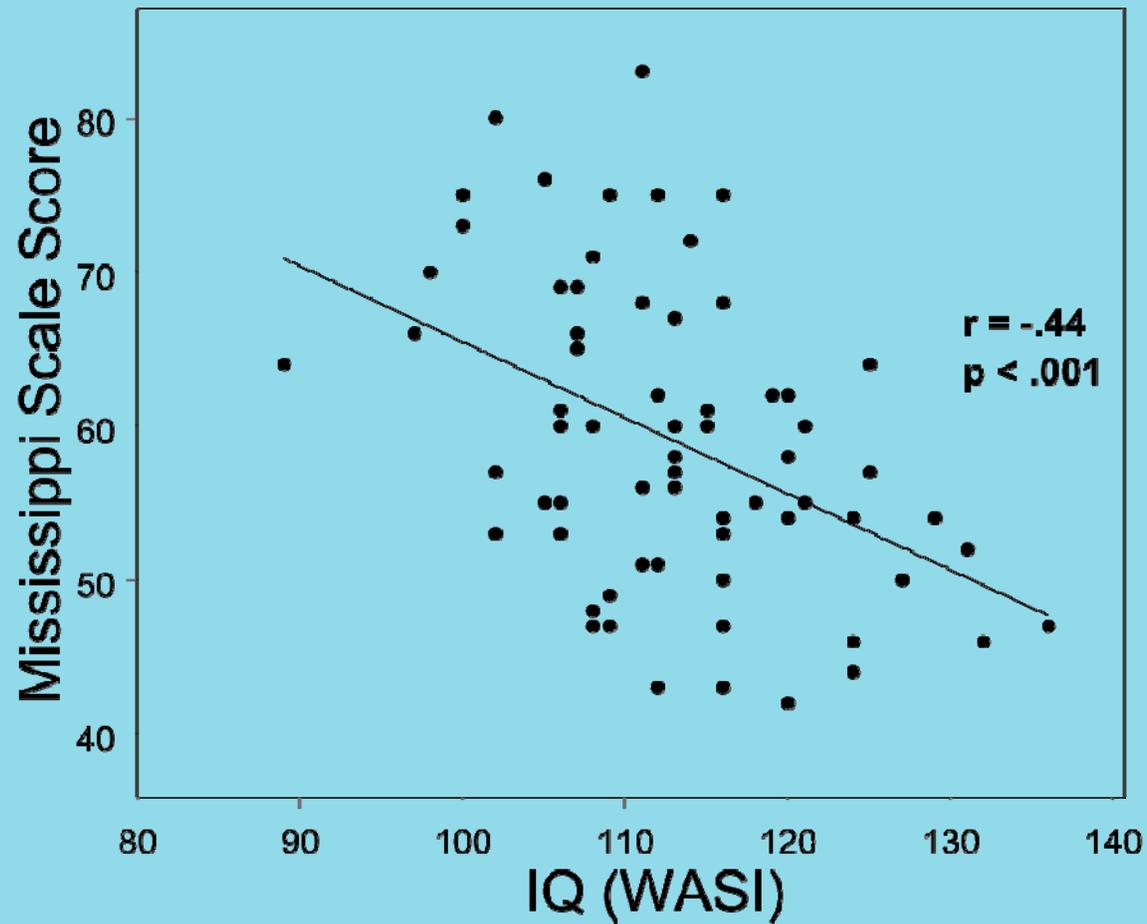
	MCS	PCL	PDI
PDEQ	$r = .47^*$	$r = .49^*$	$r = .65^*$
PDI	$r = .33^*$	$r = .47^*$	--



PDEQ vs. PDI



IQ Predicts MCS

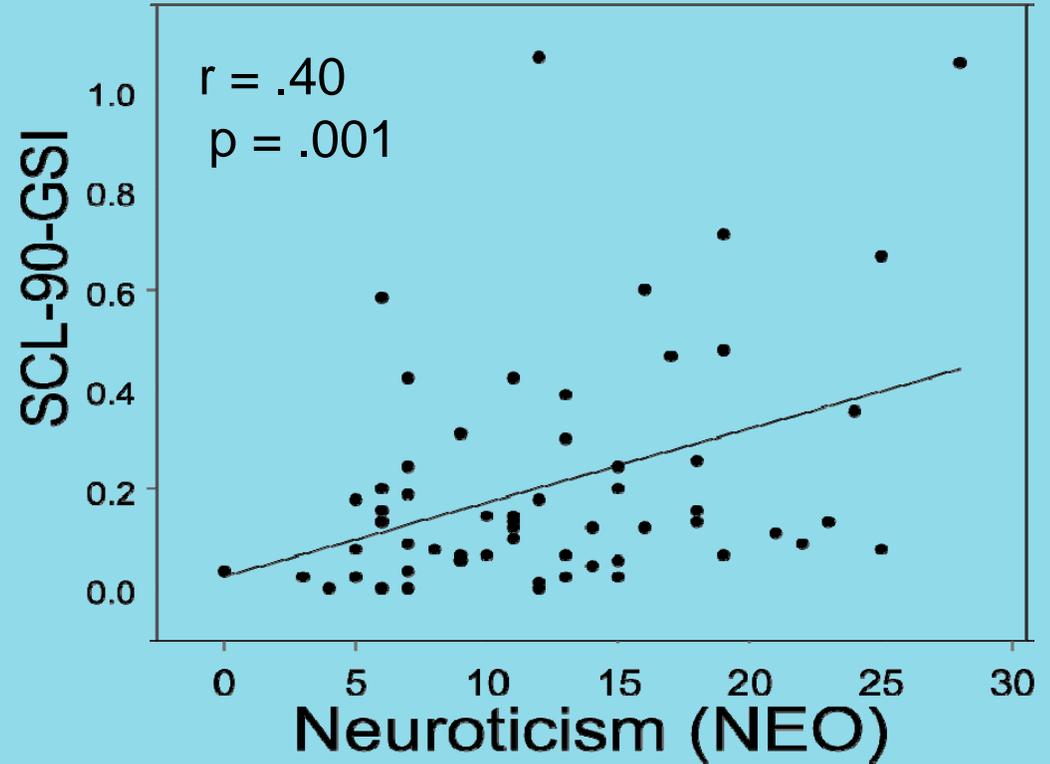
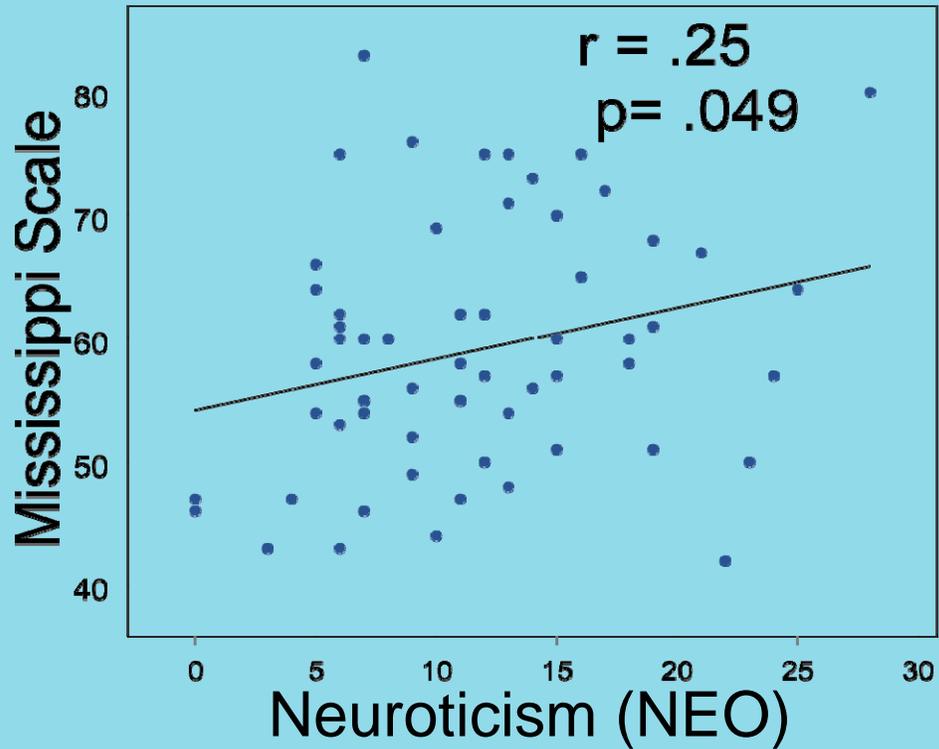


Family History

	Family Hx Depression	Family Hx PTSD
MCS	$r = .04$	$r = .13$
PCL	$r = .25^*$	$r = .39^*$
SCL-90-GSI	$r = .31^*$	$r = .31^*$



NEO Neuroticism



Next Steps

- Genotyping
- fMRI
- Years 2 to 7 police service

